

Patent Claims

1. A device for sorting different materials, comprising a conveyor belt and at least one sensor which is assigned to the conveyor belt and senses pieces of material in a location-dependent manner on the conveyor belt, and at least one actuator which sorts out pieces of material in accordance with signals of the at least one sensor in a location-dependent manner, characterized in that an electromagnetic actuator is used, comprising at least one energizable coil (10) rotatably suspended about a shaft (7), said coil (10), starting from a basic position, performing a rotational movement about the shaft (7) in the gap between a pair of first oppositely magnetized permanent magnets (8) to a second position in a gap between a pair of second oppositely magnetized permanent magnets (9), comprising a magnetic field which in the gap of the second permanent magnets (9) extends opposite to the direction of the magnetic field in the gap of the first permanent magnets (8), the rotational movement of the coil (10) effecting an actuating operation for sorting out the piece of material.

2. The sorting device according to claim 1, characterized in that the at least one electromagnetic actuator is arranged at the side of the conveyor belt (30).

3. The sorting device according to claim 1 or 2, characterized in that the at least one actuator (24) is driven in a location-dependent manner so as to pivot an ejector (15) connected to the actuator (24) into the transportation path of the correspondingly sensed piece of material for sorting out the piece of material.

4. The sorting device according to claim 1, characterized in that the at least one electromagnetic actuator is arranged behind the end of the conveyor belt (30) at the outlet side, and that the ejector (15) is pivotable into the flight path of the correspondingly sensed piece of material.

5. The sorting device according to any one of claims 1 to 4, characterized in that the windings of the coil (10) extend in planes which are substantially positioned perpendicular to the shaft (7).

6. The sorting device according to any one of claims 1 to 5, characterized in that the permanent magnets (6) are made from neodymium-iron boron.

7. The sorting device according to any one of claims 1 to 6, characterized in that the permanent magnets (6) are formed as plate-like ring segments.

8. The sorting device according to claim 7, characterized in that the inner radius and the outer radius of the ring segments have their origin at the shaft (7).

9. The sorting device according to any one of claims 5 or 7, characterized in that the coil (10) comprises two legs (17) which are radially oriented relative to the shaft (7).

10. The sorting device according to any one of claims 1 to 9, characterized in that the coil (10) is held on a carrier (11) which is suspended from the shaft (7), the end of the carrier (19) opposite to the coil (10) forming an adjusting member (15).

11. The sorting device according to any one of claims 1 to 10, characterized in that the respective permanent magnets

(6) are held at the one side and at the other side of the gap on a respective base plate (2), the base plates (2) forming parts of an exterior housing structure (1).

12. The sorting device according to claim 11, characterized in that a bearing in which the shaft (7) is held is provided in each base plate (2).

13. The sorting device according to any one of claims 1 to 12, characterized in that the coil (10) is supplied with current by means of silicone-coated stranded wires (20).

14. The sorting device according to claims 11 and 13, characterized in that a respective stranded wire (20) is arranged at each side of the carrier (11) and connected to the housing structure (1).

15. The sorting device according to claim 11, characterized in that the base plates (2) are spaced apart by a housing wall (4) enclosing the coil (10) and the permanent magnets (6).

16. The sorting device according to any one of claims 1 to 15, characterized in that at least one further pair of

third permanent magnets (22) is provided of opposite pole to the pair of second permanent magnets (9), with a gap thereinbetween, and a further coil (40) is provided, said further coil (40) being offset relative to the first coil (10) such that it is positioned closer to the pair of third permanent magnets (22) and is energized whenever a rotational movement takes place from the pair of second permanent magnets (9) to the pair of third permanent magnets (22).

17. The sorting device according to claim 16, characterized in that the position of the coils (10; 40) between the respective pairs of permanent magnets (8; 9; 22) is used for an actuating operation.

18. The sorting device according to claim 1, characterized in that the pairs of permanent magnets (8; 9) cover a sector of about 90° .

19. The sorting device according to claim 16, characterized in that the three pairs of permanent magnets (8; 9; 22) cover a sector between 120° and 180° .

20. The sorting device according to any one of claims 1 to 19, characterized in that in the basic position the coil (10) is acted upon by negative or positive voltage and the polarity thereof is reversed for transfer from the basic position into the second position.

21. The sorting device according to claim 20, characterized in that the coil (10) is energized for a return movement from the second position into the first position.

22. The sorting device according to claim 13 or 14, characterized in that the respective stranded wire (20) is laid in a loop having a length several times the direct connection path between a connection point at the coil (10) and a connection point at the housing side.

23. The sorting device according to any one of claims 1 to 22, characterized in that a plurality of electromagnetic actuators (24) are arranged side by side, forming a modular unit.

24. The sorting device according to claim 23, characterized in that the shafts (7) of the individual electromagnetic

actuators (24) from which the coils (10) are suspended are positioned along a line.

25. The sorting device according to claim 4 in combination with claim 23 or claim 24, characterized in that the sensor field (33) senses pieces of material in a location-dependent manner on the conveyor belt (30) and, in accordance with signals of the sensor field (33), corresponding actuators (24) of a modular unit (23) arranged behind the end of the conveyor belt (30) at the outlet side are driven in a location-dependent manner to pivot an ejector (15) connected to the respective actuator (24) into the flight path of the correspondingly sensed piece of material.

26. The sorting device according to any one of claims 1 to 25, characterized in that it is used for sorting different pieces of material.